

WHAT IS CLAIMED IS:

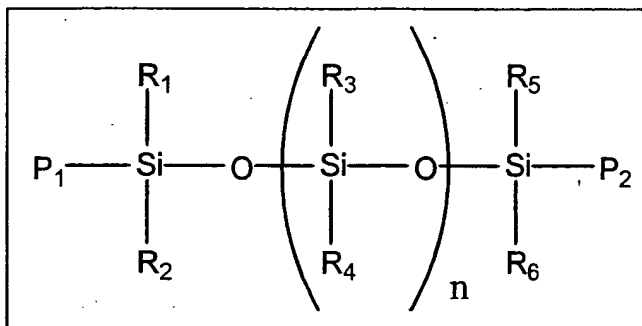
1. A mold release agent comprising a functional siloxane, a crosslinker, a thickening agent, a base, and water, said functional siloxane being dispersed in water.
2. A mold release agent according to claim 1, said functional siloxane being a silanol-functional siloxane.
3. A mold release agent according to claim 1, said functional siloxane being bi-functional.
4. A mold release agent according to claim 1, said crosslinker being a tetra-alkoxy functional silane.
5. A mold release agent according to claim 1 said crosslinker being a tri-alkoxy functional silane.
6. A mold release agent according to claim 5 said tri-alkoxy functional silane having the general formula $X-SiABC$ where X is selected from the group consisting of methyl, vinyl, acetoxy, hydride and ethyl groups, and A, B and C are each individually an alkoxy group.
7. A mold release agent according to claim 6, wherein A, B and C are each individually selected from the group consisting of methoxy, ethoxy and propoxy groups.
8. A mold release agent according to claim 1, said functional siloxane having at least one functional group selected from the group consisting of silanol-, vinyl-, alkoxy-, hydride-, amino-, and carboxy-functional groups.
9. A mold release agent according to claim 1, said mold release agent having less than 5 grams VOCs per liter of said mold release agent.
10. A mold release agent according to claim 1, having no flash point.

11. A mold release agent according to claim 1, being effective to facilitate at least 3 effective releases of molded composite parts from a mold surface with substantially no detrimental transfer of mold release agent to said molded composite parts.
12. A mold release agent according to claim 1, further comprising at least one component selected from the group consisting of wetting agents and surfactants.
13. A mold release agent according to claim 1, further comprising a slip agent.
14. A mold release agent according to claim 1, further comprising a dye.
15. A mold release agent according to claim 1, further comprising a transfer control agent.
16. A mold release agent according to claim 1, effective to provide substantially uniform wetting of a mold surface when applied thereto via spraying or wiping.
17. A mold release agent according to claim 1, said mold release agent being effective, after curing for less than 5 hours at room temperature following application to a mold surface, to facilitate effective release of a molded epoxy part.
18. A mold release agent according to claim 1, said mold release agent being effective, after curing for less than 40 minutes at room temperature following application to a mold surface, to facilitate effective release of a molded gelcoat part.
19. A mold release agent according to claim 1, said base being ethanolamine.
20. A mold release agent according to claim 1, having a pH of 7-11.
21. A mold release agent according to claim 1, having a viscosity of 10-10,000 cP at 25°C.

22. A mold release agent according to claim 1, being effective to provide substantially no detrimental transfer to a molded composite part molded on a mold surface coated with said mold release agent.

23. A mold release agent according to claim 1, said functional siloxane having the following structure: $\text{HO}(\text{CH}_3)_2\text{-Si-O-Si}(\text{CH}_3)_2\text{-O-Si}(\text{CH}_3)_2\text{)}_x\text{-O-Si}(\text{CH}_3)_2\text{OH}$, where x is selected such that said functional siloxane has a molecular weight in the range of 4,000 - 100,000.

24. A mold release agent according to claim 1, said functional siloxane having the following structure:



where R_1 , R_2 , R_3 , R_4 , R_5 and R_6 individually can be the same or different, each being selected from the group consisting of C_{1-3} alkyl, vinyl, hydride, and alkoxy groups, where n is about 0 to about 100,000, and where P_1 and P_2 can be the same or different, each being selected from the group consisting of silanol, hydride, alkyl, vinyl, carbinol and carboxy groups.

25. A mold release agent comprising a functional siloxane, a crosslinker, a thickening agent, a base, a surfactant, and water, said functional siloxane being dispersed in water, said mold release agent having a shelf life of greater than five months at about 25°C .

26. A mold release agent comprising a functional siloxane, a crosslinker, a thickening agent, a base, a surfactant and water, said functional siloxane being dispersed in water, said mold release agent having an initial viscosity of 10-10,000 cP at 25°C .

27. A method of preparing a water based mold release agent for molded composite parts, comprising the steps of:

a) providing a Part 1 composition, said Part 1 composition comprising 0.01-10 weight percent functional siloxane, 0.1-10 weight percent crosslinker, 0.01-10 weight percent surfactant, and water;

b) providing a Part 2 composition, said Part 2 composition comprising 1-25 weight percent catalyst, and 20-80 weight percent thickening agent;

c) providing a Part 3 composition, said Part 3 composition comprising a base; and

d) blending said Part 1, Part 2, and Part 3 compositions together to provide said mold release agent, said base being effective to adjust the pH of said mold release agent to 7-11 to thereby activate said thickening agent to provide said mold release agent with an initial viscosity of 10-10,000 cP at 25°C.

28. A method according to claim 27, wherein said Parts 1, 2 and 3 are blended at 0-40°C.

29. A method according to claim 27, said functional siloxane being a silanol-functional siloxane.

30. A method according to claim 27, said functional siloxane being bi-functional.

31. A method according to claim 27, said crosslinker being an alkoxy-functional silane.

32. A method according to claim 31, said alkoxy-functional silane being a tri-alkoxy-functional silane having the general formula $X-SiABC$ where X is selected from the group consisting of methyl, vinyl, acetoxy, hydride and ethyl groups, and A, B and C are each individually an alkoxy group.

33. A method according to claim 27 said functional siloxane having at least one functional group selected from the group consisting of amino-, vinyl-, alkoxy-, hydride-, and carboxy-functional groups.

34. A method of molding a composite part comprising the steps of:

a) providing a mold surface;

b) providing a mold release agent, said mold release agent comprising a functional siloxane, a crosslinker, a thickening agent, a surfactant a base, and water, said functional siloxane being dispersed in water;

c) applying a coating of said mold release agent via wiping or spraying to said mold surface; and

d) allowing said coating to dry for a period of time.

35. A method according to claim 34, said period of time in step (d) being about 15 minutes.

36. A method according to claim 34, wherein said steps (c)-(d) are repeated until 4 of said coatings have been applied to said mold surface.

37. A water based mold release agent made by the method of claim 27.